

**Faculty of Engineering,
the Built Environment
and Information Technology**
Technology for tomorrow

Faculty Engagement Projects



A word from the Dean

OUR university's icon, Nelson Mandela, once said: "Education is the most powerful weapon which you can use to change the world".

The Faculty of Engineering, the Built Environment and Information Technology is in the privileged position of extending education initiatives into the broader community as you will read in this publication.

The faculty has a strong focus in assisting schools to improve the quality of education at this level. Another focus is to make a difference in the broader community in ensuring a better life for our people.

Some of our key partners include the Department of Transport, MERSETA, TRAC SA, SANRAL, GMSA, AIDC, VWSA, NMMM, Faculty of Science and university management. The faculty is grateful for their support and the commitment of our staff and students.

Our faculty will continue to provide quality graduates and technological innovation, and to put society at the centre of our activities.

Prof Henk de Jager

Greater outreach in bid to meet engineering shortage

Our faculty is growing its own future students

THE Faculty of Engineering, Built Environment and Information Technology in collaboration with the Faculty of Science, is responding to the ongoing crisis in maths and science education in South Africa with an increasing number of initiatives.

Many of the projects, however, go beyond improving the pass rate in these subjects, and aim to improve the lives of learners and others in general – be it through research or by providing equipment or knowledge.

"Our faculty will continue to provide quality graduates and technological innovation and put society at the centre of our activities," says the faculty's dean Professor Henk de Jager.

At present, the faculty has nine established projects aimed at meeting the challenge of producing future graduates in the fields of engineering, science and technology ranging from annual competitions to hands-on weekly tuition for

high school learners.

"It's all part of our objective of growing our own students for a better South Africa," says Prof de Jager.

Recently, the government cited its need for an extra 30 000 engineers by 2014. This follows earlier cries for the country's institutions of higher education to respond to meet the critical shortage need for engineers, construction managers, quantity surveyors and IT professionals.

The projects initiated by the faculty targets different sectors of the school market but all with the same goal – that of building skills and knowledge around science and maths in a bid to lure learners to study in the fields of engineering, science or technology.

The faculty also works closely with Further Education and Training (FET) colleges to increase capacity at colleges and with industry to ensure its students receive up-to-date tuition and are exposed to prospective employers.

Our faculty will continue to ... put society at the centre of our activities.



ON TRACK ... Learners from Grade 12 at Walmer High School accompanied by (from left) Executive Dean of the Faculty of Engineering, Built Environment and IT Professor Henk de Jager, EC TRAC Lab Manager Tarin Roberts and Civil Engineering's Head of Department Johan Barnard, are among the dozens of youngsters who are benefitting from umpteen initiatives by the faculty to meet the critical shortage of engineers and other specialists in South Africa.

SANRAL lab gives learners hands-on experience

Top matriculant praises STEM project

HISTORICALLY disadvantaged top schools achiever Ndileka Makaluza credits our Engineering School's Science, Technology, Engineering and Related Management/Mathematics Fields (STEM) Pipeline Project for much of her success in obtaining six distinctions in the matric exams.

The project also inspired her to change her prospective field of study to Mechatronics.

"In January last year I had problems with physical science. The classes helped in a big way. Everything was explained to us and we did practical work as we hardly did this at school. After being part of the project, I noticed a gradual improvement in my physical science marks," she said.

Ndileka and a few others from Douglas Mbopa Secondary School joined learners from schools all over the metropole for afternoon classes at Missionvale Campus last year.

The project sponsored by

the South African National Roads Agency Limited (SANRAL), equips learners with skills to enter the science, technology and engineering fields of tertiary studies.

"Schools with outstanding results in physical science and mathematics are targeted with Grade 10, 11 and 12 learners having to have a minimum mark of 65% for maths and science to qualify," says STEM project laboratory manager Isabel van Gend.

She says the two-hour practical session every two weeks is curriculum-based and emphasises an understanding of the underlying scientific principles.

SANRAL also offers scholarships to deserving Grade 11 and 12 learners interested in a career in civil, electrical, transportation, electronic and computer engineering.

"This project is a great thing. By doing the practical work, we could do and see what we were studying. The group was small, so we received individual attention. The lecturer was accommodating and patient. We did not know much about computers and it was exciting and refreshing learning how to use technology in our subjects," Ndileka recalled.

Schools involved with the programme include Alexander Road, Collegiate, Daniël Pienaar, Douglas Mbopa, Ethembeni Enrichment Centre, Framesby, Lungisa, Pearson, Uitenhage and Westering with Bethelsdorp, Despatch, Muir, St Thomas and Strelitzia.

BIG HELP ... Top achiever Ndileka Makaluza praises the School of Engineering's maths and science project for assisting her in increasing her marks substantially with their practical support.

By doing the practical work, we could do and see what we were studying



NEW OPTIONS ... NMMU's Professor Christo van Loggerenberg (left) and SANRAL CEO Nazir Alli officially opened the SANRAL STEM laboratory on Missionvale Campus in April.

Joint venture to grow engineers

THE South African National Roads Agency (SANRAL) has joined hands with our School of Engineering in an initiative to encourage learners to gain skills to enter fields of technology, engineering and science.

The partnership culminated in the opening of a laboratory at NMMU's Missionvale Campus.

"We want to change attitudes towards maths and science ... and use innovative information communication technologies to support effective teaching and learning models," says project manager of new SANRAL STEM laboratory Riekie Slabbert.

Grade 11 and 12 learners from various schools in the area are now receiving valuable preparation towards careers in the related fields, and tuition to equip them for studying in the fields of science, engineering and technology.



Designs on their future

A NEW competition to showcase the design talents of learners in the Eastern and South Western Cape region was introduced with great success.

The top three candidates each received bursaries as part of the School of Engineering's drive to attract top Grade 12 learners to study at NMMU.

Selected schools using Auto CAD were invited to encourage learners to enter with prizes valued at more than R70 000. Apart from the individual bursaries of up to R15 000 per year, the school of the winning learner also received

R10 000 for its technical education department.

Learners had to design and build a vehicle that would travel along a 2m track, touch the wall at the end of the track, and return back down the track. Technical accuracy of report and design drawings were also critical to the success of the learner's project.

"The competition taught me a great deal about Auto CAD and gave me hands-on practical experience about what I can expect in this type of field," said Bryden Armstrong, a Grade 12 learner from Selbourne College in East London.



DEBUT WINNERS ... NMMU lecturers Karl du Preez (back left) and Howard Theunissen (back right) congratulate the winners of the first School of Engineering Grade 12 Design Competition (back) Gregory Franck, of Nico Malan High School in Humansdorp who was the overall winner, and Fourie van der Westhuizen and Thabo Swanepoel.

Technology keeps folk in touch

RESEARCH on the use of mobile technology by the School of Information Communication and Technology (ICT) is benefitting the likes of spaza shop owners, rural clinics and health care services.

Projects run under the supervision of ICT's Professor Darelle van Greunen involving 4 MTech and 4 PhD students form part of an agreement with SAP Research Pretoria and is funded by amongst other, the Department of Science and Technology, the German government and DEG bank in Germany.

"I look at ICT as an enabler in the community, especially the rural community," says Prof van Greunen, who investigates what is required for people to successfully use technology.

This includes aesthetics, navigability, accessibility for people with visual impairment, culture and the context of use. In the case of the school's work in Limpopo's Kgautwane and the Eastern Cape regions, the work mainly entails mobile user experience and change management to benefit these communities.

"I look at ICT as an enabler in the community"



CONNECTED ... The School of ICT's Professor Darelle van Greunen's research on mobile business applications is benefitting the likes of Sanna, and dozens of others who live and work in rural areas.

"Spaza shop owners often have to travel long distances, sometimes even on foot, to purchase stock. Instead they could use a cellphone to order their goods and have it delivered," says Prof van Greunen.

The user experience research group investigates suitable technologies to benefit the community and ensures that the technology intervention results in a positive user experience.

Worst-performing school benefits from support

Giving back where it is needed most

The School of Engineering's bid to help one of the worst performing schools in Nelson Mandela Bay proves that with time, effort and know-how things can change.

A FEW years ago Masibambane Senior Secondary School in Kwazakhele only managed a 19% matric pass. Within two years, that pass rate had leapfrogged to 56% thanks to an initiative by the School of Engineering to try to make a difference.

And hopes are high that this figure will have improved even more once last year's results have been released, not only at Masibambane, but also at Loyiso High School in Zwide where the University Collaborative Learning (UCL) initiative is now also working.

UCL is the brainchild of Mphathisi

Colwana (see below) which in three short years has attracted the attention of the likes of NMMU's Centre for Teaching, Learning and Media; Pick 'n Pay; MTN and the faculty's Department of Mechanical Engineering.

Learners are mainly taught maths and science by students in a bid to improve the matric pass rate and give learners a broader scope of career opportunities once they start their tertiary studies.

"We are very proud of the learners that we have been able to assist through this programme," says Mphathisi, who was master of ceremonies at a prize-giving session for both disadvantaged schools in October.

"Through strategic partnerships with role players and other key stakeholders, we hope to reach even more learners to drastically improve the matric pass rate in the Bay."

Leading by example

MECHANICAL Engineering student Mphathisi Colwana leads by example. He wanted to make a difference. But he didn't wait for others to show him the way. He led it.

After identifying a need (that of helping Grade 12s to improve their marks), Mphathisi rallied other enthusiastic engineering students together to assist youngsters by providing extra tuition.

Following Mphathisi's lead, the faculty adopted it as a formal community project and offered financial assistance.

As a result, the University Collaborative Learning (UCL) outreach programme was born.

Students volunteer their time and knowledge to assist learners at several disadvantaged schools in the Bay, mainly on Saturday mornings.

STAR STUDENT... Mphathisi Colwana.





LEADERS ... Some of the key players behind the historic partnership between NMMU and its MERSETA Chair in Engineering Development including its chair Karl du Preez (left).

ISOE accreditation with merSETA

IN what is hailed as a first for a university, Nelson Mandela Metropolitan University (NMMU) has gained the prestigious status of being an Institute of Sectoral or Occupational Excellence (ISOE), accredited with the manufacturing, engineering and related services SETA (merSETA).

Representatives from merSETA and NMMU recently signed a cooperation agreement that enables the

NMMU has proven itself as an institution that would lend itself to being a centre of excellence

merSETA Chair in Engineering Development, based at NMMU, to work closely with merSETA and to grow and develop as an ISOE. It further allows for various opportunities to work on specific projects that have been earmarked especially within the previously disadvantaged areas.

According to Carmen Adams, merSETA project manager, this is the first time that merSETA has accredited a university as an ISOE. Up to now merSETA has acknowledged ISOEs from industry and FET colleges.

"This agreement will enable the Chair to collaborate with the Govan Mbeki Maths Development Unit (GMMDU), managed by Professor Werner Oliver, to establish a Math, Science and Engineering incuba-

tor school in the rural areas of Somerset East in the Eastern Cape," said Karl du Preez, merSETA Chair in Engineering Development.

"In the short while that we have been doing business together, NMMU has proven itself as an institution that would lend itself to being a centre of excellence and it should be recognised as such," said Christo Basson, merSETA Senior Manager: LETQA (Learnerships, Education, Training and Quality Assurance).

When asked about this specific project, Prof de Jager said, "This is a project with a different focus and an extremely exciting one. In a short space of time, NMMU and especially the merSETA Chair in Engineering Development, has proved its seriousness towards this project. Recognition in the signing of the agreement proves that merSETA is satisfied with the progress made thus far."

This is a project with a different focus and an extremely exciting one

Lab upgrade

THE drawing/cad laboratory at Khwezi Lomso Secondary School was upgraded as one of the projects of the merSETA Chair. The Chair will be supporting selected technical schools in the metro.

Chair objectives

THE merSETA Chair for Engineering aims to, among others:

- ▶ Develop support programmes for FET colleges
- ▶ Place engineering students in industry
- ▶ Promote and monitor the development of women in engineering fields
- ▶ Create an awareness of the relevance and importance of engineering within rural communities
- ▶ Promote engineering and technology among Grade 9 learners at rural Eastern Cape schools
- ▶ Increase capacity of technical educators at technical schools in the Eastern Cape
- ▶ Make bursaries available to BEng Mechatronics students.

TRAC EC lab aids learners affected by strikes, lack of facilities

Expanding its reach

AN education intervention initiative supporting science, maths and technology education in secondary schools lived up to its promise in the Eastern Cape when it reached out to learners.

The Technology Research Activity Centre (TRAC) based at NMMU's Department of Civil Engineering opened its facilities to complement the teaching of learners.

The lab aims to readdress not only educational problems, but industrial shortages too.

"The intervention by TRAC minimised the effects of the various interventions," said Masibamane Secondary School principal Bongani Gade.

Most of these schools do not have the necessary equipment to conduct scientific experiments

"The University Collaborative Learning tutors who help in the TRAC labs have sacrificed their valuable time in order to make a difference in the lives of our learners."

In Nelson Mandela Bay, TRAC Eastern Cape reaches out to 13 schools in the metro. Either selected or all learners studying physical science in Grades 10, 11 and 12 benefit from the tuition during term or school holidays.

In addition to the laboratory facilities at NMMU, TRAC also has five mobile laboratories that go to schools in Mdantsane, Uitenhage, Mthatha, Fort Beaufort and Cala.

"Most of these schools do not have the necessary equipment to conduct scientific experiments."

According to the TRAC EC lab manager Tarin Roberts, there are many problems when it comes to transporting students from their schools to the labs.

"Sadly, they have to pay for their own transport."



MEETING NEEDS ... Among those to benefit from the work of the Technology Research Activity Centre (TRAC) at NMMU were learners Amlindile Maphathiza (fourth left) and Mzukisi Tshekela (right) who were supported by the likes of (from left) Walmer High School principal Lunga Dyani, physics teacher Irefaan Langeveldt, Civil Engineering department head Johan Barnard, TRAC EC lab manager Tarin Roberts, Civil Engineering's Andre Nagel and TRAC EC regional manager Beauty Kotela.

Tutors have sacrificed valuable time to make a difference in the lives of our learners

However, if, and when, extra funding becomes available, arrangements are made to transport the learners to their TRAC labs.

The TRAC programme was first introduced to South Africa from the USA in 1994.

Get connected

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AECDP Winter School success continues

THE Automotive Experiential Career Development Programme (AECDP) runs a number of initiatives to address the crisis in mathematics and science education in South Africa.

Both its Winter School and Mathematics Development Programme have been extremely successful in reversing the poor marks of learners from previously disadvantaged communities and paving the way for tertiary studies in these fields.

Started in 2005 as a pilot programme, the

various initiatives have attracted the support of Nelson Mandela Bay Municipality (NMBM) and the Automotive Industry Development Centre. The Social and Economic Development (SED) Alliance is also supportive of the projects that have seen many learners enrol at NMMU in the fields of science, engineering and technology.

About 200 learners in Nelson Mandela Bay who are

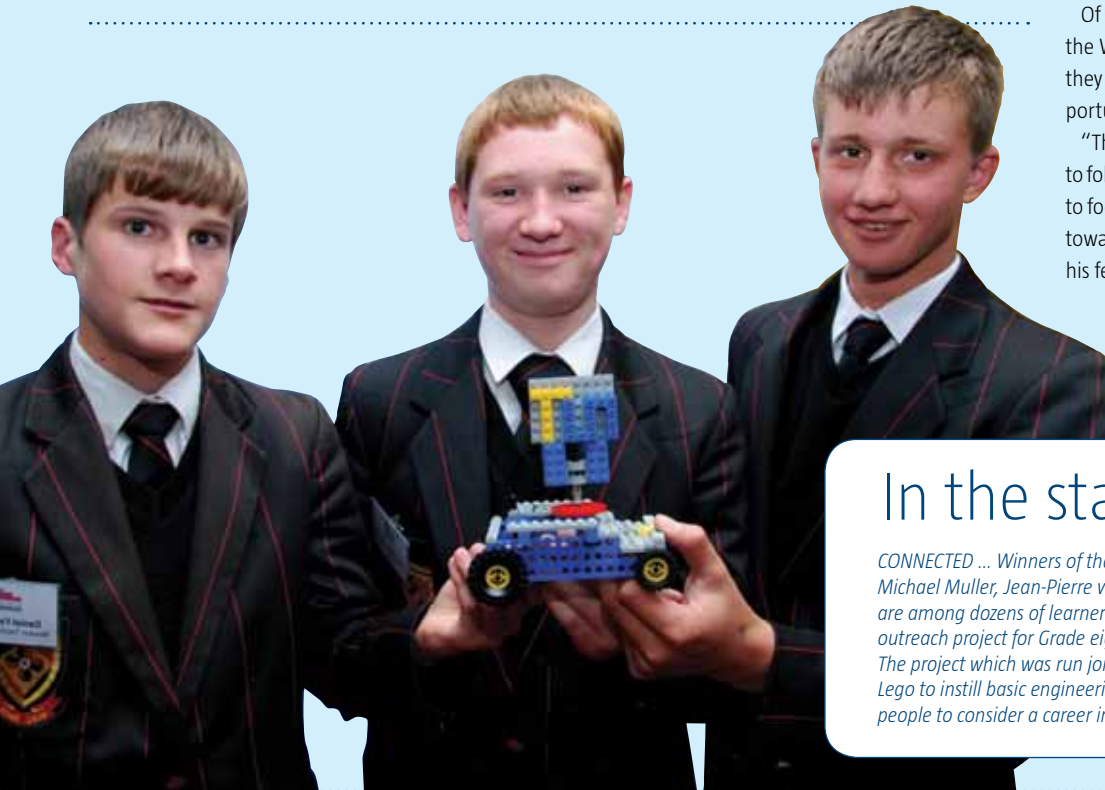
selected after testing for mathematical potential, benefit annually by attending Saturday morning tuition sessions at Missionvale Campus from mid-February through to early August. This tuition is held in conjunction with the Govan Mbeki Sasol Mathematics Development Programme in the Department of Mathematics and Applied Mathematics at NMMU which targets problem areas in the matric mathematics syllabi.

Of the 200 learners, 30 are also chosen to attend the Winter School during the mid-year break when they are exposed to various study and career opportunities at NMMU.

“The Winter School has given me the inspiration to follow a career path in engineering and helped us to focus on improving our pass rates so we can work towards our future,” said one of the participants in his feedback form in July.

To encourage these achievers even further, NMMU and industry offers a number of study bursaries for those who wish to pursue qualifications in the engineering fields.

The Winter School has given me inspiration to follow a career in engineering. ”



In the starting blocks ...

CONNECTED ... Winners of the GMSA Starting Blocks competition (from left) Michael Muller, Jean-Pierre van Zyl and Daniel Ferreira of Newton Tech, are among dozens of learners to benefit from the long-running technology outreach project for Grade eight learners at 15 schools in Nelson Mandela Bay. The project which was run jointly by NMMU and General Motors South using Lego to instill basic engineering principles, was a means of encouraging young people to consider a career in the fields of science, engineering or technology.

